

Infected Primary Total Knee Arthroplasty Due To *Aeromonas Hydrophilia*. Case Report And Literature Review.

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Citation

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Abstract

Purpose: *Aeromonas hydrophilia* is bacteria found in the water of warmer climate areas and is resistant to empirical antibiotics. Furthermore, it can live in aerobic and anaerobic environments and when it causes a skin or soft tissue infection it can mimic a staphylococcal or streptococcal infection but is much more pathogenic and destructive. In this report a 60 year old male three weeks post elective primary total knee replacement presented to hospital with an infected prosthesis. He had his staples removed two weeks post operatively by the community nurses and a small proximal wound discharge was noted, however at the three week mark post operatively the knee became a swollen, red and painful. He had systemic symptoms and was taken for a washout and poly liner exchange for which *Aeromonas hydrophilia* was isolated from fluid and soft tissue cultures.

INTRODUCTION

Aeromonas hydrophilia are Gram-negative bacteria, that are member's of the family Vibrionaceae.^{1,2} The bacterium is a facultative anaerobic organism that is very mobile with flagella and because of this it can be very toxic to many organisms.^{1,2} It can be isolated from a variety of places including lakes, rivers, rainwater, swimming pools and seawater.³⁻⁹ Furthermore, *A. Hydrophilia* is mainly found in areas with warmer climates and can survive in aerobic and anaerobic environments.^{1,2} It is highly resistant to multiple medications, chlorine and cold temperatures.¹⁻⁶

A. Hydrophilia infections in humans are rare but it is usually associated with gastroenteritis followed by soft tissue infections, pneumonia, endocarditis, osteomyelitis and septic arthritis.¹⁻⁹

Wound infections by *A. Hydrophilia* have been reported by accidental puncture of skin followed by exposure to contaminated water or soil³⁻⁹. The infections often have a rapid progression and may require surgical debridement, amputation of extremities and a few fatal wound infections have been reported in healthy adults.³⁻⁸ There has only been one reported case of *A. Hydrophilia* infection in a knee arthroplasty in Turkey¹⁰ and no other reported cases worldwide.

A literature review was completed on September 9, 2011 with PubMed, Medline, EmBase and Google Scholar. The keywords *Aeromonas Hydrophilia* and arthroplasty with zero reports found in all except for Google scholar, which returned one result. Separate entries within each were placed with the keywords *Aeromonas Hydrophilia* and skin and soft tissue infections and another entry with knee arthroplasty and gram-negative bacteria infection.

In this report we describe an unusual case of a primary total knee arthroplasty infection caused by *A. Hydrophilia* in an otherwise immunocompetent individual in northern New South Wales, Australia.

CASE REPORT

A 60-year-old Anglo-Saxon male with medial compartment osteoarthritis had initially consulted the orthopaedic surgeon in September 2008. He had advanced osteoarthritis on x-ray however he was not symptomatic enough for warrant a total knee arthroplasty initially. In September 2010, he returned with increasing pain, a decreased range of motion and the ability to walk only 100m. A diagnostic arthroscopy was performed and showed grade 2 changes in the patella-femoral joint, grade 4 medial compartment changes, grade 3 changes in the lateral compartment along with a torn medial meniscus. The patient was then booked for a total knee

replacement in March 2011.

The patient was an active individual of average height and weigh whom sold tractors for a living. He was fit and well with nil significant past medical history and not taking any regular medications. However he was a smoker with a 30 pack year history.

The total knee arthroplasty was preformed with normal sterile precautions in regards to prepping, draping and surgical hoods. One gram of intravenous Cephazolin was given prior to the tourniquet being inflated. A medial incision with a medial parapatella approach, standards cuts and jigs were used along with the patella not being resurfaced. A Zimmer CR flex with an uncemented femur, cemented tibia and cross-linked poly was placed. The Knee was closed with vicryl for the capsule and subcutaneous layer and staples were used for the skin. One drain was placed under the capsular layer and left for 24 hours and removed. Cephazolin antibiotic prophylaxis for 24 hours was commenced along with Clexane as DVT prophylaxis. The patient was discharged on 100mg of aspirin and to have the dressing changed and staples to be removed by the community nurse two weeks after the surgery and to follow-up with the orthopaedic surgeon at six weeks.

When the community nurse removed the staples, an ooze on the proximal aspect of the wound was noted and a smaller dressing was placed. The patient continued to mobilise and had regular physiotherapy. He also began taking showers and baths with the dressing removed and started going into his swimming pool in his backyard immediately after the staples were removed. His home's water supply was tank water and his pool was a salt-water swimming pool, however the water was chlorinated.

At three weeks post total knee replacement the patient noted a continual discharge from the proximal aspect of the wound, redness, swelling and fever. He presented to a peripheral hospital where swabs were taken of the discharge and he was commenced on intravenous cephazolin 1g and told to present to Lismore Base Hospital the next day. On review by the orthopaedic team the knee was noted to be swollen with anterior cellulitis, a continual discharge from the proximal aspect of the wound and the patient had a CRP of 200 and a white cell count of 14. He was immediately taken to theatres for an open washout, synovectomy and change of the poly liner. The procedure was done under tourniquet with a longitudinal midline incision using the old

scar. All the suture material was removed and frank pus was found in the superficial layers and haemoserous fluid was found in the deep layer. The specimens were sent for microbiology and thorough debridement was carried out from the superficial to the deep layer. The wound was washed out with peroxide, pulse lavage of 10 liters of normal saline and 1 liter of normal saline with Gentamicin. Gloves and drapes were then changed and using clean instruments a new poly liner was inserted. PDS was used to close the deep and superficial layers and prolene for skin. Furthermore, two drains were placed and sterile dressing was applied. He was then commenced on Cephazolin 1g intravenous qid and ciprofloxacin 750ml intravenous bd. A PICC line was inserted with regular CRP's commenced. The drains were removed two days post washout.

Aeromonas Hydrophilia was isolated from the intraoperative samples and was sensitive to Ciprofloxacin, Gentamicin and resistant to Ampicillin, Cephazolin, Augmentin, Cefotaxime and Meropenem. On advice from the infectious disease department he was then commenced on Tazocin 4.5g tds via Baxter pump intravenously and Ciprofloxacin 500mg PO bd. The patients CRP gradually decreased from 218 initially to 6 at 14 days post washout. He continued the antibiotics for six weeks and at three months post replacement had some residual pain with a decent range of motion and a well-balanced knee. His CRP was normal and he recommenced physiotherapy to help with the range of motion.

With the patients permissions samples of water were taken from the patient's home, which included the bathroom sink tap, showerhead, and bathtub tap along with the outdoor swimming pool. The samples were then sent to the microbiology department at Lismore Base Hospital and *Aeromonas hydrophilia* was isolated from the patient's swimming pool water sample with a 96% probability and excellent identification confidence.

DISCUSSION

Aeromonas Hydrophilia has been reported as the causes of various types of infection in humans.¹⁻⁹ It is mainly associated with gastroenteritis, soft tissue infections, wound infections, osteomyelitis, peritonitis etc³⁻¹⁰. The organism can cause soft tissue destruction within 72hours because of the myonecrosis caused by the release of Aerolysin Cytotoxic Enterotoxin, which is produced by *A. Hydrophilia*.^{1,2} The severity of the infections is dependent of host factors with septicemia and bacteremia usually being seen in the

immunocompromised patient.^{1,2}

A. Hydrophilia infections often mimic streptococcal or staphylococcal however the standard empirical antibiotic therapies are not effective against it due to the resistance.^{9,14} The rapid onset of the infection along with its destructive nature of the pathogenicity should alert the clinician to the possibility of the infection and urgent debridement and washout should be preformed.^{1-3,8,14} Furthermore, knowing that the organism may exist in certain areas and that it is resistant to empirical antibiotics an regimen should be considered to cover for *A. Hydrophilia* to prevent fulminant infection.¹⁻⁹

Only one article pertaining to *A. Hydrophilia* infection of a knee arthroplasty was found¹⁰. From the Turkish¹⁰ article the likely cause was attributed to multiple operations performed in the same area¹⁰. However, in our case study the likely cause of the infection was the patient swimming in his pool, which contained *A. Hydrophilia*, compounded by the fact that he still had an open wound with serous ooze. Intravenous Tazosin was used for both patients^{10,14}, however in the Turkish article a staged revision with spacer¹⁰ was performed and in our case the joint was washed out early with copious amounts of saline along with a poly liner exchange.¹¹

We recommend that patients should continue to dress their wounds with sterile dressings until they have completely sealed over and healed. Furthermore, due to the many households in the area using tank water, patients should avoid having baths and continue to shower with waterproof dressings until their wound has completely healed and not until 4-6 weeks after the operation should patient begin to swim in pools. Further research should be done on the safety of home water for surgical wounds because it was noted that the organisms *E-coli*, *Campylobacter* and *Giardia* were isolated from some of the home water sample in this case. These organisms could potentially infect patient wounds if they are exposed to them before they are healed.

In conclusion, prosthesis infection is an unfortunate risk associated with primary knee arthroplasty¹¹⁻¹³. A lot of precautions are taken preoperatively, intraoperative to prevent infection. This includes good pre-operative assessment, skin checks, sterile technique, hoods and prophylactic antibiotics^{12,13}. However, post-operatively while the wound still is not healed precautions are left to the patient whom may not be compliant or not understand the

consequences of infection. Patients should continue to dress their wounds with waterproof dressings until completely healed and not swim or soak the wound until so.

Furthermore, they should also be warned about the signs of infection¹¹ and to present to the hospital immediately so samples can be taken if infected and in this case due to the rapid and destructive nature of the organism^{1,2} have an early debridement and washout and be commenced on the appropriate antibiotic¹⁴ in order to have the best possible outcome in a bad situation.

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